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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/542,222	04/04/2000	Aleksandar Purkovic	2204/A32	5959
34845	7590	12/20/2005	EXAMINER	
STEUBING MCGUINNESS & MANARAS LLP 125 NAGOG PARK ACTON, MA 01720			FERRIS III, FRED O	
			ART UNIT	PAPER NUMBER
			2128	
DATE MAILED: 12/20/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/542,222	PURKOVIC ET AL.
	Examiner	Art Unit
	Fred Ferris	2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 11 October 2005.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-7 and 13-20 is/are rejected.
- 7) Claim(s) 8-12 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 04 April 2000 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

DETAILED ACTION

1. *Claims 1-20 have been presented for examination based on applicant's amendment filed 11 October 2005. Claims 1-7, and 13-20 remain rejected by the examiner. Claims 8-12 are objected to. Claims 2-5 and 15-18 contain allowable subject matter but stand rejected under 35 USC 101 as depending from independent claims 1 and 14 respectively (See below).*

Response to Arguments

2. *Applicant's arguments filed 11 October 2005 have been fully considered.*
Regarding applicant's response to 102(e) rejections: *The main thrust of applicants arguments center around arguing that the prior art fails to teach a technique for coefficient calculation. While the examiner agrees with applicants that the prior art Simeon does in fact teach "several established techniques" for the calculation of coefficients, Simeon goes far beyond simply stating that "one of several established techniques" for calculation of the coefficients can be used as alleged by applicants. Simeon is in fact much more specific. For example, at column 4, line 53 Simeon recites the following:*

"Another technique based on modeling the channel as an auto-regressive (AR) model is described in P. Melsa et al., "Impulse Response Shortening for Discrete Multitone Transceivers", IEEE Trans. On Communications, Vol. 44, No. Dec. 12, 1996. Based on a process length of N taps, the algorithm computes the Nth order AR model using an iterative technique based on a multichannel version of the Levinson algorithm. The computed poles are then used in an all-zero filter to cancel the modeled poles, thus leaving only the finite number of zeros as the CIR."

Here, Simeon clearly discloses an auto-regressive model using the multichannel Levinson algorithm (as does the present invention, see specification: page 18, lines 4-7)

and computing (determining) the Nth order auto-regressive model iteratively inclusive of all-zero poles (e.g. pole zero, as in the invention's ARMA, specification: page 18, lines 6-11). In this case the actual calculation of the coefficients occurs inherently as part of the Levinson algorithm (See: Melsa, page 1167, col. 1, para:1) and includes combining the inversion of the coefficient matrices representing channel impulse response (para:2). Further, since the reference discloses that the algorithm computes the Nth order of the auto-regressive model using an iterative technique (i.e. multiple (two or more) passes), it anticipates the limitations relating to a "two-pass" auto-regressive moving average model. The examiner also notes that the Levinson algorithm techniques of the Melsa reference, disclosed at column 4, line 55 of Simeon, include an auto-regressive moving average model (ARMA). (See: Melsa, page 1666, column 1)

As to the training logic being "operably coupled to determine a set of coefficients", the Simeon reference clearly sets forth an equalizer being "trained" via a channel communications link (i.e. operable coupled) at least at column 5, line 48-61 and that a "first round of training is preformed to determine the coefficients on an initial FEQ" with subsequent FEQ convolution (abstract) to a time-domain equalizer representation (column 3, line 40). Therefore, the examiner asserts that the prior art does in fact anticipate the claimed limitations relating to "calculating the coefficients" and "training logic operably coupled to determine a set of coefficients" for a "time-domain equalizer using a two pass auto-regressive moving average model". That is, considering the reference in its entirety, the prior art anticipates the claimed limitations of the present invention relating to claims 1, 6, 7, 13, 14, 19, and 20.

Applicants also appear to be engaging in circular reasoning by arguing, on the one hand, that "it is difficult to see how Simeon is even relevant to the present invention (page 9, line 2), after stating in the opening arguments that "Like the presently claimed invention, Simeon teaches a technique to help shorten the impulse response of a channel" (page 8, line 6). Obviously, Simeon is relevant as recognized by applicants, and clearly "reads on" the claimed limitations of the rejected claims as asserted by the examiner. Therefore, for the reasons set forth above, and below under 102(e) rejections, the examiner maintains the 102 rejections of claims 1, 6, 7, 13, 14, 19, and 20.

Regarding applicant's response to 101 rejections: Applicants have argued that claims 1-6 and 14-19 are drawn to statutory subject matter because a human being cannot measure the impulse response of a channel using pencil and paper, and that the mathematics required for coefficient calculation is complex. The examiner respectfully disagrees with this reasoning. First, the recited "combining" of shortened channel impulse response with an inverse shortened channel response to obtain a third shortened channel impulse response does not recite a tangible result. The examiner submits that to establish a practical application of the invention, there must be either a physical transformation or a useful, concrete and tangible result. It is not until the "combining" of channel responses is applied in a meaningful way that it has a real world value and becomes a tangible result. In this case, there does not appear to be a tangible result since the claim does not recite a meaningful application as a result of the "combining". Here, the examiner notes that the actual practical application of the

combining appears to occur as disclosed by applicants in Figures 14 and 23, where the SSNR is computed from the combined shorted channels and then TEQ coefficients providing the best SSNR are selected as a result of the “combining”. The TEQ coefficients are then used in providing equalization for the upstream/downstream channel (spec: page 33, line 21). These specific tangible resulting elements have not been specifically claimed. Second, the claimed “program product” (claim 14) does not appear to impart any functionality. The examiner asserts that the recited “program product” is drawn to nonstatutory descriptive material since applicants have not specifically claimed a program product that is embodied on a computer-readable medium that when executed on a computer, causes the processor to perform the claimed channel modeling, inversion logic, or coefficient determination elements. See 101 rejection below.

The examiner therefore maintains the 35 USC 101 rejection of claims 1-6 and 14-19.

Regarding applicant’s response to the objection to the specification: The examiner withdraws the objection to the specification for improper incorporation by reference since the cited references appear to merely be drawn to background information (see IDS below) and are not needed to support the specific claimed limitations as noted in applicants response.

Regarding applicant’s response to Double Patenting rejections: The examiner concurs with applicant’s arguments that the claimed subject matter of the present invention is drawn to a two-pass technique (i.e. a determining a first and second

channel impulse response) as opposed to the two-channel technique (i.e. an embedded two-channel autoregressive model via a low-order / high-order model and multi-channel Levinson model) as recited in the '795 patent. Accordingly, the double patenting rejection is withdrawn.

Drawings

3. *Applicant's drawings submitted on 4 April 2000 are informal and therefore acceptable for examination purposes only. New formal drawings will be required when the case is allowed.*

Information Disclosure Statement

4. *The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. Specifically, page 4 of the specification lists 13 documents that have not been included on a PTO-1449 IDS form.*

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 1-6 and 14-19 are rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter.**

Per claims 1 and 14: The Examiner submits that method claim 1, as written, is merely drawn to a mental process for channel shortening, since the language of the claims can be interpreted as meaning the method is an abstract mental process and not tangibly embodied (i.e. not a computer process).

MPEP 2111 [R-1] recites the following:

**"2111 [R-1] Claim Interpretation; Broadest Reasonable Interpretation
CLAIMS MUST BE GIVEN THEIR BROADEST REASONABLE
INTERPRETATION**

During patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). < Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969) (Claim 9 was directed to a process of analyzing data generated by mass spectrographic analysis of a gas. The process comprised selecting the data to be analyzed by subjecting the data to a mathematical manipulation. The examiner made rejections under 35 U.S.C. 101 and 102. In the 35 U.S.C. 102 rejection, the examiner explained that the claim was anticipated by a mental process augmented by pencil and paper markings. The court agreed that the claim was not limited to using a machine to carry out the process since the claim did not explicitly set forth the machine. The court explained that "reading a claim in light of the specification, to thereby interpret limitations explicitly recited in the claim, is a quite different thing from reading limitations of the specification into a claim, ' to thereby narrow the scope of the claim by implicitly adding disclosed limitations which have no express basis in the claim." The court found that applicant was advocating the latter, i.e., the impermissible importation of subject matter from the specification into the claim.). See also *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997) (The court held that the PTO is not required, in the course of prosecution, to interpret claims in applications in the same manner as a court would interpret claims in an infringement suit. Rather, the "PTO applies to verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in applicant's specification.")"

More specifically, the recited “combining” of shortened channel impulse response with an inverse shortened channel response to obtain a third shortened channel impulse response does not appear to be a tangible result. “Combining” in this instance is merely a thought, or a computation, and in and of itself does not appear to be a tangible result. The Examiner therefore submits that, in view of the language of the claims, Applicant’s have merely claimed a manipulation of abstract ideas by a mental process that is not tangibly embodied.

Section 2106 [R-2] (Patentable Subject Matter — Computer-Related Inventions) of the MPEP recites the following:

“In practical terms, claims define nonstatutory processes if they:
– consist solely of mathematical operations without some claimed practical application (i.e., executing a “mathematical algorithm”); or
– simply manipulate abstract ideas, e.g., a bid (Schrader, 22 F.3d at 293-94, 30 USPQ2d at 1458-59) or a bubble hierarchy (Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759), without some claimed practical application. ”

Per claim 14: In addition to the issues noted above, independent claim 14, as written, merely drawn to nonstatutory descriptive material since the claimed “program product” does not appear to impart any functionality. (i.e. not a computer program product embodied on a computer-readable medium)

MPEP 2106 recites the following supporting rational for this reasoning:

“Descriptive material can be characterized as either “functional descriptive material” or “nonfunctional descriptive material.” In this context, “functional descriptive material” consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of “data structure” is “a physical or logical relationship among data elements, designed to support specific data manipulation functions.” The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) “Nonfunctional descriptive material” includes but is not limited to

music, literary works and a compilation or mere arrangement of data. Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se. Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized."

In this case, applicants have not claimed program product that is specifically embodied on a computer-readable medium that when executed on a computer cause the processor to perform the claimed channel modeling, inversion logic, or coefficient determination elements. Dependent claims 2-6 and 15-19 inherit the defects of the claims from which they depend.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. *Claims 1, 6, 7, 13, 14, 19, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,233,276 issued to Simeon.*

Regarding independent claims 1, 7, 14, and 20: Simeon teaches a communications system inclusive of coupled first and second communications devices (CL1-L17-35, Figs. 1-2B) including transmission of training signals (CL5-49-61, Fig. 2C) and determining coefficients (Abstract, CL2-L31-51, Fig. 2B) for a time-domain

equalizer (CL3-30-55) and a multi-pass auto-regressive averaging filter (CL4-L53-62) in determining a shortened impulse response (CL4-L9-67, CLCL5-49-61, Fig. 2C). That is, Simeon discloses a channel shortening method, apparatus and program product by determining the shorted channel impulse response by combining the computed shortened channel impulse response from a first and second communication channel. The examiner has interpreted the claimed time-mirrored image process of the claimed invention to be functionally equivalent to the time windowing techniques disclosed by Simeon (CL8-L63-67, CL9-L1-27, Fig. 5).

Regarding dependent claims 6, 13, and 19: Simeon teaches a communication channel consisting of a ADSL upstream channel (CL1-L41-55, Fig. 1).

Allowable Subject Matter

7. *Claims 8-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 2-5 and 15-18 also appear to contain allowable subject matter and would also be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and providing the issues relating to 35 USC 101 rejection of independent claims 1 and 14 can be resolved. In this case, the prior art of record does not disclose the specific arrangement of elements or sequence of steps relating to the claimed pole-zero model, predetermined cyclic prefix length, or first and second approximation by coefficient determination of the claimed invention.*

Conclusion

8. **THIS ACTION IS MADE FINAL.** *Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).*

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Application Publications 2002/0106035 issued to Harikumar et al teaches determining a shortened impulse response for .ADSL communications channels

"A Simple and Effective Precoding Scheme for Noise Whitening on Intersymbol Interference Channels", Laroia et al, IEEE Transactions of Comm. Vol. 41, No. 10. IEEE 1993 teaches time-domain equalization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 571-272-3778

and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 571-272-3700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached at 571-272-3780. The Official Fax Number is: (703) 872-9306

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December 13, 2005*



A handwritten signature in black ink, appearing to read "F. Ferris" above a date. The date is written as "Dec 21 2005" in a cursive style.